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ABSTRACT

Features of the matrix model of the research university and myths about the academic enterprise are described, along with serious dissonances in the U.S. university system. The linear model, from which the matrix model evolved, describes the university's structure, perceived mission, and organizational behavior. A matrix model portrays in concise, visual terms key features of the organization and mission of the comprehensive research university and its interdependent relationships with other universities and external agencies. An organizational map highlights the orthogonal roles of administrative and intellectual leaders, the negative consequences of preoccupation with institutional rankings, and the inadequacies of organizational structures for relating the basic research mission to the undergraduate instruction and public service missions. The "theory" of the university, often embedded in an outmoded mythology, also contributes to serious dissonances in the academic enterprise. The structure and theory must both be reconsidered in efforts to reconceive the role of the major research universities in the postindustrial society. (Author/SW)

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Organizational Models and Mythologies of the American Research University

Abstract:

A novel matrix model portrays in concise, visual terms many key features of the organization and mission of the comprehensive research university and its interdependent relationships with other universities and external agencies. This organizational map highlights the orthogonal roles of administrative and intellectual leaders, the negative consequences of preoccupation with institutional rankings, and the inadequacies of organizational structures for relating the basic research mission to the undergraduate instruction and public service missions. The "theory" of the university, often embedded in an outmoded mythology, also contributes to serious dissonances in the academic enterprise. The structure and theory must both be reconsidered in efforts to reconceive the role of the major research universities in the postindustrial society.

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January, 1986

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Introduction

To understand the behavior of an organization, it is necessary to understand its organizational context - how it is constrained by and how it responds to its organizational environment. This implies an appreciation of both the organizational structure and the theory of the organization. As defined by Schon (1973), the organizational structure is the set of roles and relations among individuals; the theory consists of the views held within the social system about its purposes, its operations, and its future.

In a recently published paper (Alpert 1985), I have argued that many of the challenges faced by the American research university are obfuscated by the fact that the formal organizational chart is archaic and misleading and that the functions the university must perform are not and cannot be discharged through the formal structure provided in its charter. I presented a new model for the comprehensive research university, the so-called "matrix model," which describes in concise, visual terms some key features of the university's organization, mission, and relationships with the external environment. The matrix model is a descriptive model; it portrays and makes sense of many aspects of the university that have been observed by others (Bess 1982, Richman and Farmer 1976, Yarmolinsky 1975).

Originally developed to illuminate academic responses to retrenchment, the matrix model has proved useful as a basis for discussing many other characteristics of the American university which, over recent years, have remained undiscussed and undiscussable. In this paper, I review the principal features of the matrix model, and describe some features of the "theory" of the academic enterprise - theory which is often embedded in its mythology. This provides a basis for understanding some serious dissonances in the system of American universities.

The key motivation for my work in this area is the stimulation of organizational learning, the need for which is underlined by recent commission reports and the statements of many academic leaders who have appealed for new directions in the system of higher education (Study Group on the Conditions of Excellence in American Higher Education 1984, Boyer and Hechinger 1981, Newman 1985). Having observed that many of the most vexing problems of our universities are, in fact, undiscussed and undiscussable, it is not my intent to start with panaceas or solutions. Rather I seek to develop a language for broad discussion of the issues and ways of dealing with them. At the least, I would like to understand why our well-intentioned efforts to introduce change have so often been frustrated - including efforts at curricular reform, governance of interdepartmental research programs, or the encouragement of improved approaches to undergraduate instruction and its assessment. I acknowledge that a search for a language of discourse inevitably focuses on the problematic issues of academia rather than its successes. But to admit to the existence of problems or dilemmas is a risk an organization should be willing to take if it is to avoid the escalation of such problems to crisis levels.

A linear model of the university

The idea of the matrix model starts with a "linear model" used by Petrie and Alpert (1983) to describe the university's structure, its internally perceived mission, and many aspects of its organizational behavior. As shown symbolically in Figure 1, the linear

Structure

$$U = \boxed{d_1} + \boxed{d_2} + \boxed{d_3} + \boxed{d_4} + \boxed{d_5} + \dots + \boxed{d_n}$$

Quality

$$Q = \boxed{q_1} + \boxed{q_2} + \boxed{q_3} + \boxed{q_4} + \boxed{q_5} + \dots + \boxed{q_n}$$

Mission

$$M = \boxed{m_1} + \boxed{m_2} + \boxed{m_3} + \boxed{m_4} + \boxed{m_5} + \dots + \boxed{m_n}$$

Figure 1. Linear Model of the University.

model is a visual representation of the observation by Coleman (1981): "It is generally agreed that institutions of higher learning are best understood as collections of fundamentally autonomous units rather than in terms of a central authority, or conception of a whole, to which they are subordinate." The linear model portrays the university as a set of autonomous academic departments and professional schools, each represented symbolically in the diagram by a separate rectangle and tied together by its institutional identity, geographic location, administration, support services, and board of trustees.

The linear model goes beyond the portrayal of organizational structure; it symbolizes the perceived institutional mission as well. The basic departmental mission is considered to be "the pursuit of excellence," the successful self-directed search for new knowledge in one of the many areas of specialization of the comprehensive research university. The assessment of departmental performance is identified with its reputation for excellence in research performance, and the most prevalent measure of departmental quality has come to be its comparative standing in a national ordering assembled by colleagues in the discipline. (See Cartter 1966.) For many academics, the improvement of its prestige ranking has become the departmental mission itself (Garvin 1980). Given these perceptions, the mission of the university is seen as the sum of its departmental missions and the quality of the institution is seen as the separately measured quality of its departments.

The linear model serves to explain many attributes of organizational performance within the university; for example, why proposed organizational or budgetary changes, justified in the larger campus interest, are perceived by faculty in terms of departmental interests, and why the expectations of external stakeholders, to whom the university is presented as having clearly defined structure and goals, are often at odds with the expectations of faculty members. But, by looking inward on the university campus, the linear model shares a serious limitation with others that have been proposed, e.g., the collegial model, the political model, the bureaucratic model, and the organized anarchy model, (for a survey, see Garvin 1980). This limitation is astutely identified by Garvin: "(these models) focus exclusively on internal decision-making rules while paying little attention to the environment in which universities operate." Furthermore, the linear model does not explain itself; it offers few insights as to why and how the various subunits can justify or sustain their separate missions.

The matrix model

The matrix model extends beyond the campus boundary; although it is compatible with many features of the models mentioned above, it expands the linear model to include the roles of institutions and actors external to the local campus, and their effects on its administration, governance, and mission.

A matrix is constructed by presenting in one diagram the linear models for the n leading universities in the nation, ($U_1, U_2, U_3, \dots, U_n$). As shown in Figure 2, each linear representation is placed above the other and the departments at the various universities are aligned one above the other, so that all anthropology departments, for example, are in the same column. Thus any given department, d_{ij} , is located on a row corresponding to specified university (U_i) and in a column corresponding to a specified discipline (D_j). It is immediately apparent that each department has special relationships with the

		Disciplines						
		D ₁	D ₂	D ₃	D ₄	D ₅	...	D _n
Universities	U ₁	d_{1,1}	d_{1,2}	d_{1,3}	d_{1,4}	d_{1,5}	...	d_{1,n}
	U ₂	d_{2,1}					...	
	U ₃	d_{3,1}					...	
	U ₄	d_{4,1}					...	
	U ₅	d_{5,1}					...	
	U ₆	d_{6,1}					...	
	U ₇	d_{7,1}					...	
	U ₈	d_{8,1}					...	
		⋮	⋮	⋮	⋮	⋮		⋮
U _m	d_{m,1}					...		

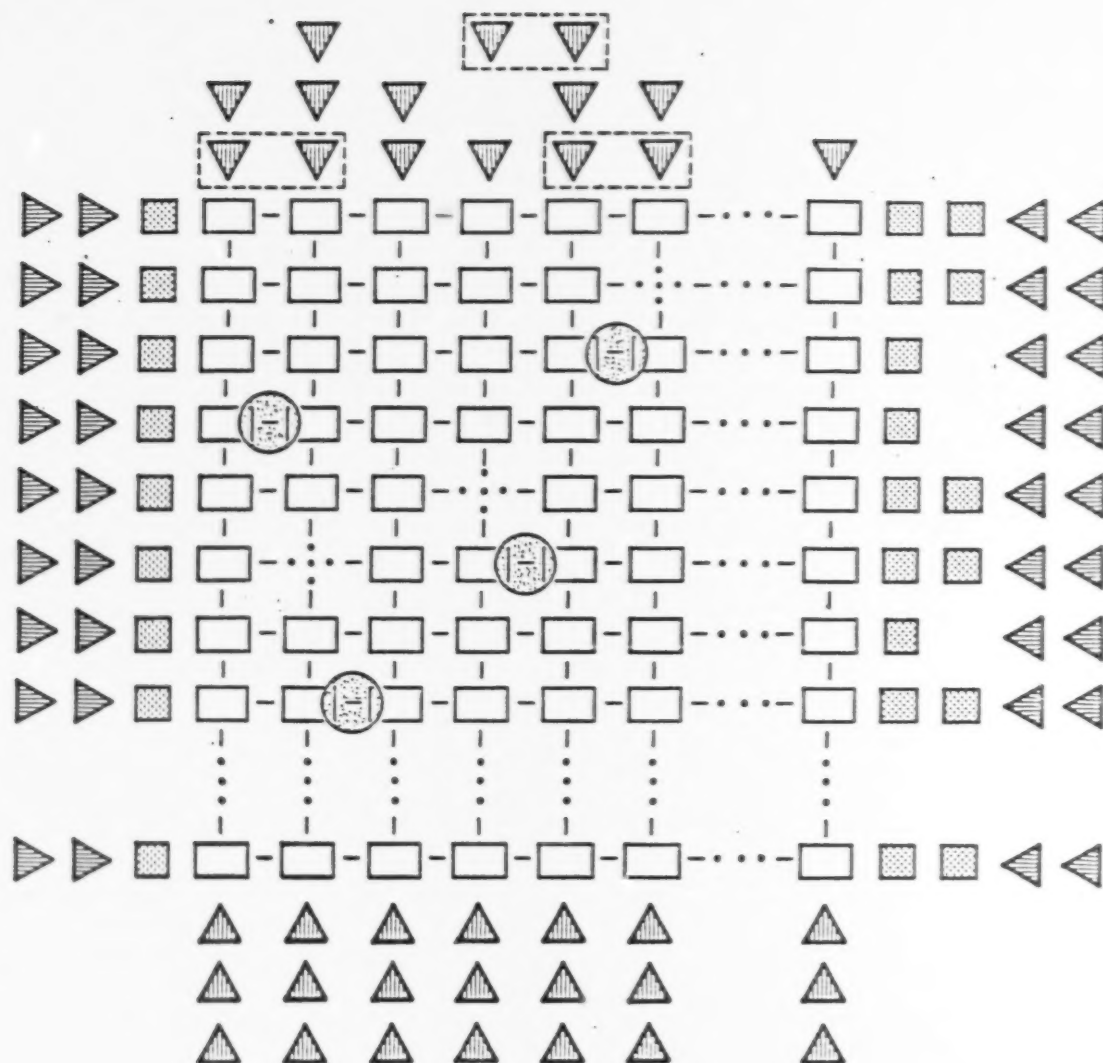
Figure 2. Matrix Model of the Research University.

other departments in its own row, which represents the campus community, and with the other departments in its own column, which represents the disciplinary community. Each of these, the horizontal and the vertical communities, may be viewed as a loosely coupled system, with significantly different forms of coupling in the horizontal and vertical directions. The departments in a given row (campus) share the same institutional name, geographic location, board of trustees, and overall organizational identity, while the departments in a given column are coupled in other significant ways, e.g., professional missions, research activities, and reward and recognition systems.

Historically, the increase in the relative influence of the disciplinary communities has been continuous since the turn of the century, as the mission of universities has shifted from the dissemination of known truths to the search for new knowledge (Veysey 1965, Rudolph 1962). The shift in emphasis from teaching to research as the primary institutional goal was accompanied by a related but different organizational change - a change which Jencks and Riesman (1968) refer to as "the academic revolution" - the transfer of authority in academic matters from the president to the faculty. The emergence of the disciplinary communities as the arbiters of institutional life corresponds to the takeover by the professoriate of the dominant role in the governance of the university. This shift was accelerated by the entry of the federal government as a major source of research support - allocated directly to individual researchers - which was to hasten the decentralization of the individual university; the various departments became more independent of the internal administration and more dependent on the support of external constituencies.

The roles of the campus and disciplinary communities in the life of the typical department can readily be identified. By and large, the horizontal (campus) community addresses itself to the undergraduate teaching mission of the university, whereas the vertical (disciplinary) community addresses itself primarily to graduate education, research, and faculty selection and performance. For students, alumni, state legislators, and for many of its other benefactors, the teaching mission still represents the principal goal of the university. The campus was originally shaped and its structure defined by the (undergraduate) teaching mission. But in the university of today, the disciplinary communities have assumed the central responsibilities not only for graduate and professional education, but also for setting the goals, justifying and selling research agendas to federal sponsors, operating professional societies, allocating academic research grants, and implementing the peer review process for the rating of individual and departmental quality. Whereas the campus communities offer tenure and faculty security, the disciplinary communities control promotion and faculty mobility.

The significant influence of the disciplinary communities is enhanced by the activities of a number of professional, economic, and political institutions external to any given campus; these include federal and private research sponsors, accrediting agencies, national professional organizations, and, for a few of the largest disciplines, national laboratories. Similarly, the campus communities are supported by an analogous array of external organizations that relate directly and uniquely to the campus communities: e.g., state governments, alumni associations, parents, and university foundations, all identified mainly with the undergraduate missions of the universities. These external organizations are logically placed in an extension of the matrix diagram, in Figure 3, and are properly considered as integral parts of the campus or disciplinary communities with which they identify.



- Multi-Disciplinary Facility
- Interdisciplinary Mission Organization
- ▲ External Support and Influence

Figure 3. Matrix Model including External Agencies and Internal Cross-Disciplinary Research Units.

In a matrix diagram such as Figure 3 it is possible, at least in principle, to identify each major university in the nation, and, based on the published ratings of its departments, to arrange the universities in descending order of institutional excellence from top to bottom. Thus the matrix diagram could be used as a convenient way of recording both the departmental and institutional ratings for every research university in the nation. Interestingly, this way of looking at the nation's universities calls attention not only to the variation in status among the various campuses (the horizontal rows), but to an analogous variation in status among the disciplines (the vertical columns) of the matrix. Although no comparable ranking among disciplines has been published or widely acknowledged, high status is accorded on most campuses to such departments as computer science, electrical engineering, chemistry, business administration and psychology - quite independent of whether the university is fifth or fiftieth in the institutional pecking order.

In recognizing the importance and nationwide character of the disciplinary communities, the model calls attention to the fact that no American university is fully autonomous. Many of the persons and institutions that determine its goals and assess its performance do not live on its campus or report to its board of trustees. In fact, the matrix diagram is simultaneously a portrayal of the entire assembly of institutions of higher education and a portrayal of any one of them; the universities of the nation comprise a single interconnected organism for higher education and research.

Structural faults in the university system

The matrix model reveals several major structural faults in the American comprehensive research university which help to interpret the contrast between their outstanding performance in many fields of basic scientific research and the inadequacies of institutional performance in other missions. These structural faults are typified by:

- o The differing agendas of intellectual and administrative leadership

The intellectual leaders are dominantly oriented to basic research and to the goals and directives of federal sponsors; they properly justify these activities in terms of contributions to national welfare. Administrative leaders must be concerned with the undergraduate mission, with the distribution and balance of resources among the campus units, with the quality and integrity of the campus as a whole, and with the public service mission of the individual university - including concern for the economy of the local region and state as well as the nation. University presidents are expected to carry the burden of leadership for institutions that are separately accountable to individual control boards but governed as part of an inseparable and interdependent nationwide system of institutions.

- o A single measure of excellence for a multi-purpose enterprise

The research universities of the nation have aspired to leadership roles in a variety of missions: basic scientific research, applied research and development, public service, undergraduate education, professional education,

education of future researchers, promoting regional and national economy, public policy analyses, etc. Excellence in all of these missions is a valid aspiration, and one often voiced in the rhetoric of university presidents and public relations officers. However, it is highly questionable, if not patently absurd, to believe that performance in missions as diverse as these can be achieved or measured by a single "bottom line" index of performance based on the assessment of original research published in refereed journals. Not only are the other missions lessened in value and significance but the nature of the effort required to achieve them is rarely considered.

- o Inadequate organizational structure for relating the basic research mission to the other university missions.

The organizational responsibility for relating the research mission of the university to the other stated missions devolves upon the individual department which, in turn, usually delegates these responsibilities to the individual professor. As Bess (1982) points out, "There are many who argue that the integrity of the university is preserved by interplay between the (research, education, and public service) missions. What in fact takes place, however, is that instead of integration of the missions through organizational structure, the 'multiple-function' professional faculty member is expected personally to make the necessary connections. . . [for which s/he has] little cross-disciplinary background, inclination, and understanding . . ."

On the individual professors fall the full responsibility for the validity and relevance of their research efforts and accountability to sponsors and clients - including the division of professorial effort on various tasks and the relevance of the research activities to instructional or other academic duties. In the case of basic scientific research, the national disciplinary communities provide the infrastructure for quality control, publication of results, interpretation to sponsors, etc. An infrastructure for applied R&D is available in the field of agriculture through the national Agricultural Experiment Stations and Extension Service. However, corresponding infrastructures for many other academic R&D activities are weak or absent.

Some dissonances in the academic enterprise

Experienced and knowledgeable observers have called attention to a number of serious dissonances in the university system, as exemplified by the following:

- o Undergraduate learning: are we asking the right questions?

Boyer and Hechinger (1982) and others have identified a number of serious inadequacies of undergraduate education - limitations in preparing students for life in a complex society. Most academic responses have focused on "curricular reform" - a redistribution of required courses - which generally amounts to a minor (politically dominated) rearrangement or renaming of conventional courses.

- o Interdisciplinary research programs: do we know how to manage them?

Hollingsworth (1984) has called attention to some of the contradictions within academic science: "American science appears to be very successful, but the trend toward specialization and lack of interdisciplinary communication could undermine its ability to address the needs of society. . . [The] development of new specialties in American science increased nine times more rapidly than the number of scientists in the 20-year period following World War II."

This tendency to specialization in academic research - dominated by single-investigator projects - limits our capacity not only for applied science but for basic science in emerging fields that transcend existing disciplines. The professoriate is inherently and ever-more fragmented. Can our disciplinary leaders develop a common vision of the future university?

- o For young faculty members, being a professor isn't much fun any more.

As reported by Schuster and Bowen (1985), "The research imperative certainly focuses the junior faculty's attention, . . . but that focus is so narrow that new recruits do not function as fully participating members of their campus communities. The pressure of this unrelenting vice leads to both anxiety and resignation."

- o Promoting the regional and national economy: can (should) we deliver?

Newman (1985) reports that State governments, providing an increased share of the support of universities, are expecting an increased contribution by the university to economic development - exemplified by stronger ties with industry, the attraction of industry to the region, and more industrial spinoffs.

This issue can be portrayed as the need to reconceptualize a vision of the land-grant university for the 21st century.

"Higher Education in the United States is entering a period of questioning of its purpose and quality." With this initial statement, Frank Newman (1985) makes an urgent call for a review of national policy toward higher education - for a major debate about the purposes of higher education and the best means to achieve them. There is little question but that a new national policy toward higher education would require new external initiatives, at state and national levels, and a broad recognition and redefinition of the role of higher education in society. However, it seems doubtful that a new national policy will be developed solely on the basis of external initiatives. The situation calls for new insights and initiatives within academia as well, including a searching reexamination of some of the mythologies of higher education. Some of the mythologies that have worked well in earlier decades are slowly being challenged within the academy under the impetus of the continuing inadequacies of federal and state funding.

On Academic Mythology

"Myths are ways of simplifying and structuring situations more complicated than we can handle. Corporate myths, like the myths of other cultures, are selective views of life, taken to be true without question. . . They permit action where decisive action seems to be required." (Schon 1967)

It is informative to note how many of the rules of academic behavior are covered by a form of corporate mythology rather than by explicit statements of policy or practice. I submit the statements below as widely accepted selective views, taken by many academics to be true without question:

- o the national peer group rankings, discipline by discipline, offer a valid measure of institutional performance
- o there is only one valid measure of academic excellence in faculty performance, based on the model of successful pursuit of disciplinary scientific research and the publication of results in refereed journals.
- o the disciplinary structuring of academic research, department by department, offers an optimal organizational approach to the acquisition as well as the dissemination of scientific knowledge
- o the values and methods of the high status disciplines can and should be adopted in other disciplinary and professional departments.
- o the search for new knowledge is a good in itself, from which benefits to society flow automatically or as byproducts, including better education, technological innovation, greater industrial productivity, national well-being, and military supremacy - a widespread belief in the automatic benevolence of science.
- o "basic science is a separable part of the total system of humanity. . . it is deemed to be value free and apart from politics. . . (and hence) we have to call upon the researcher's peers to judge his excellence." (Churchman 1982.)

My purpose is not to assert that each of these oversimplified "myths" is without validity. In fact, these views have become a part of the accepted truths of academic procedure because, at least in some sense, they have worked in the past. I submit them as examples of premises which deserve to be seriously questioned, perhaps rewritten for today's environment. Obviously, this list could be greatly extended - to include myths about the role of the humanities and social sciences, the role of the professional schools, the role of academic experts in policy-making, etc. In my view, some of the dissonances in the academic enterprise result from the unexamined acceptance of myths that came into good currency in another historical context but are in conflict with today's institutional realities.

New maps for the future

Among the most dominant of the new realities are the financial limitations of public support of the academic system. In response to these new realities, the nation's

universities, led by some of the prestigious private universities, have embarked on a search for added support from industrial corporations. Initially motivated by the desire to maintain the status quo - to augment federal support for ongoing programs - the industrial connection is being reconsidered in the larger context of the relationships of universities to the society. Some of the nation's campuses have responded to these changes in their environment with changes in the structure of their institutional relationships. This trend is exemplified by the appearance on or adjacent to some of the nation's leading campuses of major research and development facilities dedicated to the encouragement of new industrial ventures or the improved productivity of existing industry.

At the University of Illinois at Urbana-Champaign, a number of major new interdisciplinary centers have been established in the past two years, thus reversing a trend to deemphasize the role of interdisciplinary organizations on the campus. They offer the promise of major new contributions to the nation's R&D enterprise as well as to the regional economy in which our campus is situated. These new research centers constitute the reinstatement in a different economic and technological setting of some of the objectives and values of the original land-grant universities. But our campus is still in the difficult process of organizational learning. We are trying to learn how to insert such new structures into the organizational and intellectual maps of the campus without disturbing the legitimate prerogatives of existing academic units, whose turf may be affected or threatened. While this is going on, some of our faculty in the humanities and social sciences are raising questions about the impact of the "industrial connection" on the values and ideals of academic learning. If our experience is typical, the American research university is adapting to a rapidly changing environment, but with relatively little discussion of the long term implications or consequences.

Much of the recent commentary about the problems of higher education has been expressed in the language of exhortation: what we should do to maintain our status, our traditions, our integrity, our contributions to national productivity, etc. This article has presented an organizational map intended to portray the comprehensive university as it is. The matrix model reveals that our universities are inescapably a part of a larger national system, and some of the critical problems they face cannot be dealt with from the perspective of autonomous institutional independence. This model has also revealed structural faults of the research university, which would have to be seriously considered in dealing with specific problems or developing a shared vision of the future university.

Developing a sense of shared purpose, a new national policy, or a new map for the future university will call for a new mode of organizational learning. Such an effort will necessarily involve participants from various universities, and stakeholders in many other walks of life. The participants will need to develop a common language for the discussion of important issues, which may be aided through the adoption of effective models of this very complex organization. In addition, the process will call for a searching reexamination of the "theory" of our universities, including their corporate mythologies - no less a part of our institutions than the charters, the operating rules, and the contractual obligations. Research in these areas could contribute to the development of a new contextual framework for the American university in the critical years ahead.

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